

CLAIMS

1. A paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less and a constituent unit derived from at least one anionic or cationic monomer and a surfactant (B) at an (A)/(B) ratio in the range of 99/1 to 1/99 (weight ratio), the quality improver providing at least one paper quality improving effect of the followings (i), (ii), and (iii):

- (i) standard improved bulky value: 0.02 g/cm^3 or more;
- (ii) standard improved opacity: 1.0 point or more; and
- (iii) standard improved brightness: 0.5 point or more.

2. A paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less and a constituent unit derived from at least one anionic or cationic monomer and a surfactant (B) at a rate in the range of (A)/(B) = 99/1 to 1/99 (weight ratio), the quality improver providing at least one paper quality improving effect of the followings (i), (ii), and (iii):

- (i) standard improved bulky value: 0.02 g/cm^3 or more;
- (ii) standard improved opacity: 1.0 point or more; and
- (iii) standard improved brightness: 0.5 point or more.

3. A paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less in a total amount of 5 to 84% by weight in the

polymer and a constituent unit derived from at least one anionic or cationic monomer in a total amount of 1 to 80% by weight in the polymer and a surfactant (B) at an (A) / (B) ratio in the range of 99/1 to 1/99 (weight ratio).

4. The paper quality improver for papermaking according to any one of claims 1 to 3, wherein the copolymer (A) further comprises a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of 26.6 (MPa)^{1/2} or more.

5. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein, as the contents of the constituent monomers, the copolymer (A) comprises 5 to 84% by weight of the nonionic unsaturated monomer having a solubility parameter of 20.5 (MPa)^{1/2} or less, 1 to 80% by weight in total of the anionic monomer and the cationic monomer and 15 to 94% by weight of the nonionic unsaturated monomer having a solubility parameter of 26.6 (MPa)^{1/2} or more.

6. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein one of the constituent monomers of copolymer (A) further comprises a crosslinkable constituent monomer.

7. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein the HLB of the surfactant (B) is in the range of -5 to 15.

8. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein the surfactant (B) is nonionic.

9. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein the surfactant (B) is a surfactant selected from alcohols and alcohol alkylene oxide adducts containing an alkylene oxide group having 2 to 4 carbons in an average amount of 0 to less than 150 moles per 1 mole of the alcohol.

10. The paper quality improver for papermaking according to any one of claims 1 to 4, wherein the surfactant (B) is water-soluble.

11. The paper quality improver for papermaking according to any one of claims 1 to 4, further comprising a water-soluble polymer (C) having at least one of a weight-average molecular weight of 1000 to 10,000,000 and a viscosity at 25°C in an 1% aqueous solution of 1 to 4,000 mPa·s.

12. The paper quality improver for papermaking according to any one of claims 1 to 4, exerting the effect of a standard improved ratio in burst index of -3,000 or more.

13. A process of producing a pulp sheet, comprising the steps of adding the paper quality improver for papermaking according to any one of claims 1 to 4 to pulp in any step before a papermaking step and papermaking the pulp at a papermaking speed of 200 m/min or more.

14. A pulp sheet comprising the paper quality improver for papermaking according to any one of claims 1 to 4.